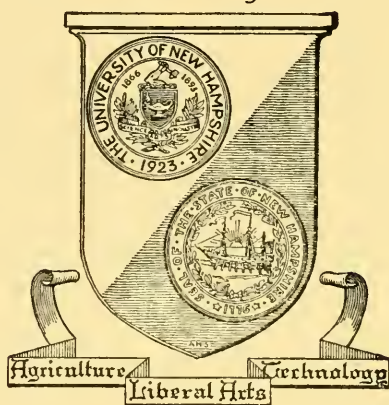




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DEPARTMENT OF AGRICULTURAL CHEMISTRY

Inspection of Commercial Fertilizers for 1923

MADE FOR THE

STATE DEPARTMENT OF AGRICULTURE



By H. R. KRAYBILL, T. O. SMITH, and C. P. SPAETH

Inspection of Commercial Fertilizers

This bulletin is a report of the results obtained in the inspection of commercial fertilizers for the year 1923, carried out by the State Department of Agriculture under the direction of the Honorable Andrew L. Felker, Commissioner of Agriculture. The State Inspector, Mr. Eugene D. Sanborn, visited practically every section of the state and collected samples of 101 brands.

In 1922 out of a total of 97 brands analyzed 23 or approximately 24 per cent. were low analysis containing less than a total of 14 pounds of plant food per 100 pounds. This year in 1923 there is a slight improvement, only 20 brands out of a total of 101 or approximately 20 per cent. are low analysis fertilizers.

There were fewer deficiencies in guaranteed analyses this year than during the preceding two years. There is still room for marked improvement. These deficiencies indicate the importance of studying this bulletin and buying from those companies whose fertilizers meet the guarantee.

The prices during the past year were very similar to those of 1922. The average prices of some of the brands were cheaper while those of others were slightly higher. An examination of Table 1 shows the importance of selecting your fertilizer according to the cost per pound of plant food rather than according to the cost per ton. The lowest price per ton fertilizer may be the highest price per pound of plant food. In the 1-8-2 fertilizer the cost of nitrogen per pound was twice as great as in the 4-8-4 brands. *Ask for high analysis fertilizer. It will pay. Do you consider the actual plant food value of the fertilizer when you buy? The object of the following discussion is to aid you in purchasing fertilizers. Use it when you buy fertilizer! The following discussion of the meaning of the analysis and the methods of calculating relative values are given to aid you in purchasing fertilizer. If you need further help write to the Department of Agricultural Chemistry, The University*

of New Hampshire Agricultural Experiment Station, Durham, N. H.

MEANING OF THE CHEMICAL ANALYSIS

Three of the ten elements essential for plant growth are most likely to be lacking in sufficient available quantity for best crop growth in our usual soils. These are nitrogen, phosphorus and potassium. Sometimes calcium, magnesium and sulphur may be deficient, but because these deficiencies have apparently not been marked and widespread, our fertilizer practices have dealt largely with the application of nitrogen, phosphorus and potassium. The value of commercial fertilizers depends, therefore, upon their available content of these three elements. For this reason manufacturers are required to state upon their label the guaranteed content of these three materials.

Nitrogen. Pure nitrogen is a colorless, odorless, tasteless gas which makes up about four-fifths of the air surrounding us. In this form, however, it is not available to plants with the exception of a few, such as legumes, which are able to get nitrogen from the air by means of the bacteria which exist on their roots. In order to be available for most plants nitrogen must be in the form of a compound known as a nitrate.

In commercial fertilizers the nitrogen occurs in three different forms as follows: (1) nitrate, (2) ammonia and (3) organic nitrogen. The nitrate nitrogen is readily soluble in water and immediately available to the plant. The ammonia nitrogen and organic nitrogen must be converted into the nitrate form before they are available to the plant. The ammonia nitrogen becomes available quite rapidly during the growing season and so can be considered as an available form. Some types of organic nitrogen such as are contained in dried blood, cottonseed meal, tankage, etc., are also rapidly converted into nitrate nitrogen in the soil and made available to the plant. Other types of organic nitrogen like those contained in hoof, hair and leather waste,

however, are only very slowly converted into nitrate nitrogen and are not readily available.

Phosphorus occurs in the various fertilizer materials principally as phosphoric acid in combination with calcium (lime). In order to be available to plants these compounds of lime and phosphorus must be soluble or be made soluble. The amount of lime combined with the phosphoric acid determines the solubility; the material containing the smallest amount of lime is the most soluble. That part of the phosphoric acid which is readily soluble in water is immediately available to the plant during the growing season. This is known as "water soluble" phosphoric acid. A part of the phosphoric acid which is insoluble in water is soluble in a certain strength of ammonium citrate solution. This is known as "citrate soluble" or "reverted" phosphoric acid. This is also available to the plant. In the analysis the "available" phosphoric acid includes the "water soluble" and the "citrate soluble." The insoluble may be obtained by subtracting the available from the total in the table of analyses. The "insoluble" phosphoric acid becomes available to the plant only very slowly.

Potassium occurs in commercial fertilizers usually in the form of chloride (muriate) or sulphate. Only the water soluble potassium is readily available to plants. The analysis, therefore, expresses the percentage of "water soluble" potash (K_2O).

Statement of the Analysis. There are numerous ways of expressing the amounts of nitrogen, phosphoric acid and potash contained in a fertilizer. The purchaser should not be misled by these statements. For instance, if a fertilizer contains 3 per cent. of nitrogen, it may be expressed as nitrogen 3 per cent., as nitrogen equivalent to 3.65 per cent. ammonia or as nitrogen equivalent to 14.1 per cent. of ammonium sulphate. The per cent. of nitrogen is the thing which is important and is the figure which should be used in calculating the value of a fertilizer. The following shows how to calculate the per cent. of nitrogen from the

per cent. of ammonium and vice versa. The nitrogen per cent. multiplied by 1.21584 gives the per cent. of ammonia. The per cent. of ammonia multiplied by 0.82247 gives the per cent. of nitrogen. Do not be misled by thinking that a tag stating 3.29 per cent. of nitrogen and nitrogen equivalent to 4 per cent. of ammonia means that the fertilizer contains the sum of these two. It does not. It means that the fertilizer contains 3.29 per cent. of nitrogen only.

For convenience, phosphorus is expressed as per cent. of "phosphoric acid" or (P_2O_5), phosphorus pentoxide. The tag usually gives the total per cent. of "phosphoric acid," the "water soluble," "citrate soluble" and "insoluble." For the purpose of figuring out the value of these we can take the sum of the "water soluble" and the "citrate soluble" and call it available phosphoric acid. The per cent. of available phosphoric acid is the figure to use in determining the value of the fertilizer. Potassium is expressed as per cent. of available K_2O or potash. This is water soluble and available to the plant.

METHOD OF CALCULATING THE RELATIVE COMMERCIAL VALUE

Because of the variations in prices during the season and the differences in freight costs, etc., it is difficult to calculate accurately the values of the different brands of fertilizer. The commercial value of a fertilizer is based upon the content of available nitrogen, phosphoric acid, (P_2O_5) and potash (K_2O). If we know the guaranteed analysis and assign approximate commercial values for a pound of each of the plant foods, we can decide the relative values of fertilizers.

The terms "unit" of nitrogen, "unit" of phosphoric acid and "unit" or potash are sometimes used to express the amounts instead of the per cent. The term "unit" means 20 pounds per ton, 2,000 pounds, or 1 per cent. One unit means 1 per cent. of a ton or 20 pounds. A fertilizer hav-

ing 4 per cent. of nitrogen has four units of nitrogen or 80 pounds per ton.

Prices of Plant Foods. It is impossible to give accurate figures for the cost of the different plant foods because the cost of mixing, bagging, freight and the manufacturers' and dealers' profits vary with the quantity purchased, distance shipped and number of persons through whose hands the material has passed. It is possible, however, to obtain figures which are sufficiently accurate for use in comparing the relative values of fertilizers.

The average cost of acid phosphate containing 16 per cent. of phosphoric acid was \$32.60 per ton. One ton contained 0.16 times 2,000 pounds or 320 pounds of available phosphoric acid. The cost per pound was \$32.60 divided by 320 or approximately 0.102 and one unit of available phosphoric acid cost 20 times 0.102 or approximately \$2.04.

The average cost of muriate of potash containing 50.0 per cent. of water soluble potash was \$50.00 per ton. One ton contained 0.50 times 2,000 pounds or 1,000 pounds of potash. The cost per pound was \$50.00 divided by 1,000 or \$0.05 and one unit of water soluble potash cost 20 times 0.05 or \$1.00.

The average cost of nitrate of soda containing 15 per cent. nitrogen was \$71.80 per ton. One ton contained 0.15 times 2,000 or 300 pounds of nitrogen; this made the cost price per unit 20 times \$0.24 or \$4.80. The average cost of tankage was \$62.50 per ton and it contained an average of 5.50 per cent. of nitrogen and 4.63 per cent. available phosphoric acid. The value of the 4.63 units of phosphoric acid was 4.63 times \$2.04 or \$9.45, making the nitrogen cost \$62.50 minus \$9.45 or \$53.05. The cost per unit of nitrogen was \$53.05 divided by 5.50 or \$9.65 and the cost per pound of nitrogen \$0.482. If we assume that our complete fertilizers contain both forms of nitrogen, we can approximate an average and use the values of \$0.36 per pound and \$7.20 per unit for nitrogen of complete fertilizers. These figures will not give the price at which fertil-

izers should be sold within the state, but they can be used to determine the relative value of the different brands which may be offered to the purchaser.

PRICES OF PLANT FOOD MATERIALS

	Per unit	Per pound
Nitrogen	\$7.20	\$0.36
Phosphoric acid (P_2O_5) available	2.04	0.102
Potash (K_2O) water soluble	1.00	0.05

Either the unit or the pound method can be used to calculate the commercial value of the fertilizer. If we have a fertilizer with the following guaranteed analysis:

Nitrogen total	3.00%
Phosphoric acid (P_2O_5) available	8.00%
Potash (K_2O) water soluble	2.00%

By the unit method we find:

Nitrogen	$3 \times \$7.20 = \$21.60$
Phosphoric acid available	$8 \times 2.04 = 16.32$
Potash (K_2O) water soluble	$2 \times 1.00 = 2.00$

Total commercial value	<u>\$39.92</u>
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By this method we multiply the per cent. of each plant food by the cost per unit and then add these figures to give the total value.

Employing the pound method we obtain:

$3 \times 20 =$ Number of pounds of nitrogen in a ton	$60 \times \$0.36 = \$21.60$
$8 \times 20 =$ Number of pounds of phosphoric acid in a ton	$160 \times 0.102 = 16.32$
$2 \times 20 =$ Number of pounds of potash water soluble in a ton	$40 \times 0.05 = 2.00$

Total commercial value	<u>\$39.92</u>
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The per cent. means the number of pounds in 100 pounds. Since there are twenty hundred pounds in a ton we multiply the per cent. by twenty to find the number of pounds of each plant food in a ton. Then by knowing the value of these per pound, we can figure the value of each plant food per ton.

BUY HIGH ANALYSIS FERTILIZERS

It costs just as much to mix, bag and deliver a ton of low analysis fertilizer as it does a ton of high analysis. For this reason the cost of the plant food must be much

higher in the low analysis fertilizer. The average cost of a 1-8-2 fertilizer the past season was \$38.40. The value of the 8 units of phosphoric acid was 8 times \$2.04 or \$16.32. The value of the two units of potash was 2 times \$1.00 or \$2.00. The value of the available phosphoric acid and potash then was \$16.32 plus \$2.00 or \$18.32 and the nitrogen cost \$38.40 minus \$18.32 or \$20.08. The average content of nitrogen was 1.12 per cent. One ton contained 1.12 times 2,000 or 22.4 pounds of nitrogen. The cost per pound of nitrogen was \$20.08 divided by 22.4 or \$0.90. The cost per unit was 20 times \$0.90 or \$18.00. On the same basis the average cost per unit of nitrogen in a 4-8-4 fertilizer is \$7.60 or less than half as much as in the 1-8-2 fertilizer.

Table No. 1 gives the cost of nitrogen in the different brands of complete fertilizer analyzed this past year.

TABLE NO. I

Relative Cost of Nitrogen in the Various Complete Fertilizers

Formula	Average cost of one pound of nitrogen	Average cost of one unit (20 lbs.) of nitrogen	Average retail price per ton
1-8-2	\$.75	\$15.00	\$38.40
1-10-3	2.04	40.80	60.00
2-8-2	.53	10.60	39.20
2-8-3	.63	12.60	43.80
2-8-4	.59	11.80	40.00
2-8-10	.47	9.40	45.00
2-10-3	.39	7.80	40.00
2-12-4	.36	7.20	42.00
3-6-10	.44	8.80	46.40
3-8-4	.44	8.80	45.20
3-8-6	.52	10.40	45.00
3-9-2	.49	9.80	46.23
3-10-4	.35	7.00	45.00
3-12-3	.19	3.80	37.20
4-6-10	.38	7.60	53.00
4-7-2	.78	15.60	70.00
4-8-4	.38	7.60	47.80
4-8-7	.37	7.40	49.00
5-6-6	.24	4.80	50.00
5-8-7	.39	7.80	55.80
6-6-4	.47	9.40	65.40
6-8-5	.46	9.20	66.00
8-6-6	.29	5.80	55.00
10-3-8	.39	7.80	75.00

CLASSIFICATION OF SAMPLES ANALYZED

Table No. 2 gives the number of samples collected and analyzed in each of the respective classes.

TABLE NO. II

Complete Fertilizer	77
Acid Phosphate	5
Sheep Manure	5
Nitrate of Soda	4
Ground Bone	4
Tankage	2
Phosphate and Potash	1
Tankage and Bone	1
Sulphate of Ammonia	1
Muriate of Potash	1

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COMPLETE FERTILIZERS

Table No. 3 shows the average analysis and retail prices for the brands of complete fertilizer analyzed. There were 77 brands of complete fertilizer which represented a slightly larger proportion of the total number than in 1922.

TABLE NO. III

Formula	Number of brands	Average per cent. of nitrogen	Average per cent. of total phosphoric acid	Average per cent. of available phosphoric acid	Average % of water soluble potash	Average retail price per ton
1-8-2	3	1.12	9.25	8.09	2.13	\$38.40
1-10-3	1	0.88	12.55	10.15	3.39	60.00
2-8-2	9	1.87	9.73	8.37	2.38	39.20
2-8-3	8	1.85	9.32	8.36	3.28	43.80
2-8-4	1	1.83	10.64	7.01	4.16	40.00
2-8-10	2	1.93	9.05	8.26	10.18	45.00
2-10-3	1	2.17	20.35	9.52	3.68	40.00
2-12-1	1	1.76	13.22	12.36	4.02	42.00
3-6-10	3	2.57	7.71	6.58	10.18	46.40
3-8-4	8	2.71	9.37	8.36	4.22	45.20
3-8-6	1	2.47	11.05	6.36	6.36	45.90
3-9-2	2	2.64	10.33	9.03	2.03	46.20
3-10-4	1	2.76	11.53	10.63	4.12	45.00
3-12-3	1	2.52	13.30	12.00	3.18	37.20
4-6-10	9	3.49	7.25	6.23	10.15	53.00
4-7-2	1	3.28	9.93	8.06	2.42	70.00
4-8-4	8	3.45	9.52	8.39	4.18	47.80
4-8-7	4	3.36	10.54	8.41	7.24	49.00
5-6-6	1	6.84	5.69	5.18	6.56	50.00
5-8-7	6	4.07	9.40	8.46	7.13	55.80
6-6-4	3	5.02	8.38	6.87	4.32	65.40
6-8-5	1	5.12	11.31	6.76	5.19	66.00
8-6-6	1	6.27	6.89	6.44	6.00	55.00
10-3-8	1	7.88	8.42	3.00	8.00	75.00

The wide range of prices again suggests the wisdom of selecting your fertilizers according to the cost per pound of plant food.

ACIDULATED PHOSPHATES

Five brands of acid phosphates were analyzed which showed from 16.00 to 17.77 per cent. available phosphoric acid. The price ranged from \$20.00 to \$53.00 per ton. *This wide range of prices again emphasizes the need of buying according to the cost of the plant food.*

SHEEP MANURE TOO EXPENSIVE

Five brands of sheep manures were analyzed which averaged 1.79 per cent. of nitrogen, 1.35 per cent. phosphoric acid and 2.64 per cent. potash. The price ranged from \$42.00 to \$62.00 per ton averaging \$52.80. Figuring their value on the basis of the cost of phosphoric acid at \$2.04 per unit, potash at \$1.00 per unit and nitrogen at \$7.20 per unit we find the average value of these sheep manures to be \$18.27 per ton. *Their cost was nearly three times their commercial value.*

DEFICIENCIES IN ANALYSIS

Twenty-one brands out of 101 analyzed or 21.0 per cent. showed a deficiency of 0.2 per cent. or more in one or more of the plant foods, nitrogen, phosphoric acid and potash. In 1922, 22.6 per cent. of the samples showed deficiencies. There is a slight improvement this year but it still indicates a serious loss to the farmer using the brands which showed these deficiencies.

Table No. IV shows the number of brands analyzed from each manufacturer and the number which met and failed to meet the guarantee. *Study this table and buy from manufacturers who maintained their guarantee.*

ANALYSES OF BRANDS

The following table shows the detailed results of the analyses of the different brands. In the table the names of the manufacturers are arranged alphabetically and under the name of each manufacturer the different brands are arranged alphabetically.

Manufacturer	Number of samples reported	Number equal to guarantee in every particular	Number equal in value to guarantee	Number not meeting guarantee but within 10% of value of guarantee	Number not within 10 % of value of guarantee
American Agricultural Chemical Co. .	21	16	21	..	..
Armour Fertilizer Works	7	5	6	1	..
Bowker Fertilizer Co.	10	7	10	..	..
Joseph Breck and Sons	1	0	0	..	1
Burlington Rendering Co.	3	3	3	..	..
Coe-Mortimer Co.	3	1	3	..	..
Consolidated Rendering Co.	5	4	5	..	..
Eastern States Farmers' Exchange ...	3	3	3	..	..
Essex Fertilizer Co.	6	5	6	..	..
International Agricultural Cop.	6	5	5	1	..
Lowell Fertilizer Co.	11	11	11	..	..
McQuesten and Lewis	1	0	1	..	..
Manchester Rendering Co.	5	1	2	2	1
National Fertilizer Co.	1	1	1	..	..
Natural Guano Co.	1	1	1	..	..
New England Fertilizer Co.	5	4	5	..	..
Pacific Manure and Fertilizer Co.	1	0	0	..	1
Parmenter and Polsey Fertilizer Co. ..	3	3	3	..	..
Pulverized Manure Co.	1	1	1	..	..
Rogers and Hubbard Co.	7	3	4	3	..

Analyses of Brands.

	AMERICAN AGRICULTURAL CHEMICAL COMPANY New York									
	NITROGEN		PHOSPHORIC ACID				POTASH			
	Guaranteed	Found	Total		Available		Guaranteed	Found		
			Guaran- teed	Found	Guaran- teed	Found				
Arrestook Potato Manure	4.11	3.86	9.00	10.48	8.00	9.45	7.00	7.04		
Bradley's Complete Manure with 10% Potash	3.29	3.29	7.00	7.13	6.00	6.15	10.00	10.00		
Bradley's Complete Manure for Potatoes and Vegetables	3.29	3.31	9.00	9.44	8.00	8.17	7.00	7.26		
Bradley's Complete Manure Top Dressing for Grass and Grain	4.94	5.16	7.00	8.28	6.00	6.78	4.00	4.09		
Bradley's Corn Phosphate	1.65	1.78	9.00	9.58	8.00	8.00	2.00	2.00		
Bradley's Eclipse Phosphate	0.82	1.01	9.00	9.34	8.00	8.44	2.00	2.07		
Bradley's Potato Fertilizer	1.65	1.81	9.00	9.13	8.00	8.00	3.00	3.04		
Bradley's Potato Manure	2.47	2.83	9.00	9.10	8.00	8.00	4.00	4.29		
Bradley's XL Super-Phosphate of Lime	2.47	2.72	10.00	10.33	9.00	9.07	2.00	2.16		
Grass and Lawn Top Dressing	4.94	5.02	7.00	8.58	6.00	7.22	4.00	4.82		
High Grade Acid Phosphate .....	....	....	17.00	17.26	16.00	16.00	....	....		
Lister's Corn and Potato Fertilizer	1.65	1.86	9.00	8.73	8.00	7.82	3.00	3.42		
Lister's 4-8-4 Fertilizer	3.29	3.36	9.00	8.95	8.00	7.85	4.00	4.00		
Lister's Success Fertilizer	1.65	1.78	9.00	9.60	8.00	7.76	2.00	2.52		
Monarch Potato Manure	3.29	3.32	9.00	9.12	8.00	8.00	4.00	4.09		
Nitrate of Soda	15.00	15.75	....	....	....	....	....	....		
Prolific 10% Potash Fertilizer	1.65	2.00	9.00	9.07	8.00	8.01	10.00	10.36		
Special Ground Bone	2.06	2.33	22.88	26.53	....	....	....	....		
Williams and Clark Americus Corn Phosphate	1.65	1.71	9.00	9.01	8.00	8.00	2.00	2.34		
Williams and Clark Americus Potato Manure	1.65	1.69	9.00	8.84	8.00	8.00	3.00	3.00		
Williams and Clark Potato Phosphate	2.47	2.56	9.00	9.19	8.00	8.11	4.00	4.19		

Analyses of Brands

	NITROGEN		PHOSPHORIC ACID				POTASH	
	Guaranteed	Found	Total		Available		Guaranteed	Found
			Guaran- teed	Found	Guaran- teed	Found		
ARMOUR FERTILIZER WORKS Carteret, N. J.								
Armour's Big Crop Acid Phosphate 16%	.....	.....	16.50	17.30	16.00	16.41	.....	.....
Armour's Corn Grower	1.65	1.74	8.50	9.65	8.00	8.83	2.00	2.19
Armour's Big Crop 3-8-4 Fertilizer	2.47	2.73	8.50	9.16	8.00	8.43	4.00	4.00
Armour's Big Crop 4-6-10 Fertilizer	3.29	3.58	6.50	6.86	6.00	6.00	10.00	10.00
Armour's Big Crop 4-8-4 Fertilizer	3.29	3.58	8.50	9.16	8.00	8.10	4.00	4.20
Armour's Grass	6.55	6.27	6.50	6.89	6.00	6.44	6.00	6.00
Armour's Sheep Manure, (1½-1 total 2½)	1.23	1.56	1.00	0.84	.....	.....	2.50	1.85
BOWKER FERTILIZER COMPANY Boston, Mass.								
Bowker's All Round Fertilizer	2.47	2.52	9.00	8.86	8.00	7.79	4.00	4.41
Bowker's Corn, Grain and Grass Phosphate	1.65	1.81	9.00	9.06	8.00	8.17	2.00	2.62
Bowker's Hill and Drill Phosphate	2.47	2.56	10.00	10.33	9.00	9.00	2.00	2.11
Bowker's Market Garden Fertilizer	3.29	3.43	9.00	9.59	8.00	8.48	4.00	4.47
Bowker's Potato and Vegetable Phosphate	1.65	1.81	9.00	8.78	8.00	7.69	3.00	3.16
Bowker's Sure Crop Phosphate	0.83	1.35	9.00	9.50	8.00	8.22	2.00	2.31
Stockbridge Early Crop Manure	4.11	3.97	9.00	9.25	8.00	8.28	7.00	7.00
Stockbridge Market Garden Manure	3.29	3.79	9.00	10.04	8.00	8.55	4.00	4.36
Stockbridge Potato and Vegetable Manure	3.29	3.54	7.00	7.40	6.00	6.09	10.00	10.11
Stockbridge Top Dressing and Forcing Manure	4.94	4.94	7.00	8.28	6.00	6.60	4.00	4.61
JOSEPH BRECK AND SONS Boston, Mass.								
Pulverized Sheep Manure Ram's Head Brand	1.50	1.37	0.75	0.83	.....	.....	3.00	2.00

BURLINGTON RENDERING COMPANY
Burlington, Vt.

Burlington 2-8-3 Fertilizer	1.64	2.01	9.00	9.71	8.00	9.21	3.00	3.29
Burlington 2-8-10 Fertilizer	1.64	1.86	9.00	9.04	8.00	8.51	10.00	10.00
Burlington 4-8-7 Fertilizer	3.28	3.52	9.00	9.32	8.00	8.11	7.00	7.00

COE-MORTIMER COMPANY
New York City

E. Frank Coe's Columbian Corn and Potato Fertilizer ..	1.65	1.91	9.00	8.87	8.00	8.00	3.00	3.39
E. Frank Coe's New England Special	0.82	0.99	9.00	8.90	8.00	7.62	2.00	2.02
E. Frank Coe's Standard Potato Fertilizer	3.29	3.47	7.00	7.15	6.00	6.00	10.00	10.47

CONSOLIDATED RENDERING COMPANY
Boston, Mass.

Ground Bone	2.05	2.96	26.00	24.93	.....	.....	.....	.....
Ground Tankage	4.52	4.76	14.00	18.32	.....	.....	.....	.....
High Grade Acid Phosphate ..	.....	.....	17.00	17.41	16.00	17.22	.....	.....
Nitrate of Soda	15.50	15.52	.....	.....	.....	.....	.....	.....
Sulphate of Ammonia	20.50	20.50	.....	.....	.....	.....	.....	.....

EASTERN STATES FARMERS' EXCHANGE
Springfield, Mass.

Eastern States 5-8-7	4.11	4.31	9.00	9.50	8.00	8.46	7.00	7.13
Eastern States 16% Acid Phosphate .....	.....	.....	17.00	17.90	16.00	17.29	.....	.....
Eastern States 3-12-3 Fertilizer	2.46	2.52	13.00	13.30	12.00	12.00	3.00	3.13

Analyses of Brands

	NITROGEN		PHOSPHORIC ACID		POTASH	
	Guaranteed	Found	Total		Guaranteed	
			Guaran- teed	Found		
						Available
ESSEX FERTILIZER COMPANY Boston, Mass.						
Essex 3-6-10 Corn, Potatoes and Vegetables	2.46	2.77	7.00	7.34	6.20	10.00
Essex 2-8-2 Farm and Garden	1.64	1.92	9.00	9.71	8.00	8.59
Essex Fish Fertilizer 3-8-4 for All Crops	2.46	2.46	9.00	9.15	8.00	8.33
Essex Market Garden 4-8-4 Potatoes, Roots, and Vegetables	3.28	3.37	9.00	10.10	8.00	8.83
Essex 4-6-10 Potato and Vegetable	3.28	3.59	7.00	7.26	6.00	6.52
Essex 5-8-7 Potatoes and Vegetables	4.10	3.91	9.00	9.09	8.00	8.47
INTERNATIONAL AGRICULTURAL CORPORATION Woburn, Mass.						
Buffalo Crop Grower	4.12	3.99	9.00	8.86	8.00	7.70
Buffalo Economy	1.60	2.23	9.00	11.20	8.00	8.13
Buffalo General Favorite	2.50	2.76	11.00	11.53	10.00	10.63
Buffalo High Grade Manure	3.30	3.54	7.00	7.40	6.00	6.06
Buffalo New England Special	1.60	1.76	13.00	13.22	12.00	12.36
Buffalo Phosphate and Potash			13.00	13.48	12.00	12.94
LOWELL FERTILIZER COMPANY Boston, Mass.						
16% Acid Phosphate			17.00	18.10	16.00	17.77
Lowell 3-8-4	2.46	2.76	9.00	10.05	8.00	8.34
Lowell 4-6-10	3.28	3.79	7.00	7.23	6.00	6.58
Lowell 4-8-4	3.28	3.56	9.00	9.61	8.00	8.74
Lowell 5-8-7	4.10	4.39	9.00	9.22	8.00	8.38
Lowell Bone Fertilizer 2-8-2	1.64	1.88	9.00	9.70	8.00	8.76
Lowell 3-6-10 Corn, Potato and Vegetables	2.46	2.54	7.00	7.91	6.00	6.67
Lowell Garden and Lawn Dressing	3.28	3.28	8.00	9.93	7.00	8.06
Lowell 2-8-3 Vegetable and Grain	1.64	1.68	9.00	10.37	8.00	8.94
Muriate of Potash						
Nitrate of Soda	15.50	15.52	....	....	....	....
						
						
						
						
						
						
						
						
						
						
						
						
						
						
						
						
						
						
						
						
						
						
						
						
						
						
						
						
						
						
						
						
						
						
						
						
						
						
						
						
						
						
						
						
						
						
						
						
						
						
						
						
						
						
						
						
						
						
						
						
						
						
						
						
						
						
						
						
						
						
						
						
						
						
						
						
						
						
						
						
						
						
						
						
						
						
						
						
						
						
						
						
						

McQUESTEN AND LEWIS Manchester, N. H.		4.12	6.84	.....	5.69	6.00	5.18	6.00	6.56
McQuesten and Lewis 5-6-6									
MANCHESTER RENDERING COMPANY Manchester, N. H.									
Manchester Animal Brand 4-8-7		3.20	3.31	14.00	14.25	8.00	9.10	7.00	7.44
Manchester Ground Bone		2.00	3.02	.....	25.02	15.00	6.68	.....	.....
Manchester Special Fertilizer for All Crops		1.64	2.17	14.00	20.35	10.00	9.52	3.00	3.68
Tankage		5.75	6.24	.....	15.59	8.00	4.63	.....	.....
Tankage and Bone		5.00	5.51	.....	18.64	10.00	6.68	.....	.....
NATIONAL FERTILIZER COMPANY New York									
National Excelsior Potato Fertilizer		3.29	3.29	7.00	7.28	6.00	6.23	10.00	10.00
NATURAL GUANO COMPANY Aurora, Ill.									
Pulverized Sheep Manure		2.25	2.38	1.25	1.65	1.00	1.39	2.00	2.06
NEW ENGLAND FERTILIZER Co. Boston, Mass.									
New England Corn Phosphate 2-8-2		1.64	1.96	9.00	10.10	8.00	9.13	2.00	2.17
New England 3-6-10 Corn, Potatoes and Vegetables		2.46	2.40	7.00	7.88	6.00	6.86	10.00	10.54
4-8-4 for Potatoes, Vegetables and Grass		3.28	3.41	9.00	9.61	8.00	8.54	4.00	4.29
New England Potato Phosphate 4-8-7		3.28	3.31	9.00	9.15	8.00	8.27	7.00	7.26
New England Super-Phosphate 3-8-4		2.46	2.91	9.00	9.68	8.00	8.86	4.00	4.00
PACIFIC MANURE AND FERTILIZER Co. San Francisco, Cal.									
Sheep Manure Groz-It-Brand		1.50	1.39	1.25	0.88	0.75	0.79	3.00	1.71

Analyses of Brands

	NITROGEN		PHOSPHORIC ACID		POTASH	
	Guaranteed	Pound	To'al		Available	
			Guaran- teed	Pound	Guaran- teed	Pound
PULVERIZED MANURE COMPANY Chicago, Ill.						
Wizard Brand Sheep Manure	2.00	2.27	....	2 54	1.25	2.22
PARMENTER AND POLSEY FERTILIZER CO. Boston, Mass.						
P. and P. 2-8-3 Corn, Fruits and Vegetables	1.64	2 00	9.00	10.12	8.00	9.19
P. and P. Plymouth Rock Brand 3-8-4	2.46	2.89	9.00	9.78	8.00	9.01
P. and P. 4-6-10 Potatoes and Vegetables	3.28	3 36	7.00	7.55	6.00	6 48
ROGERS AND HUBBARD COMPANY Portland, Conn.						
Corn and Grain Fertilizer	0.82	0.88	11.00	12.55	10.00	10.15
Nitrate of Soda	15.50	15.50	....	....	....	....
Oats and Top Dressing	8.22	7.88	8.00	8.42	3.00	3.00
Potato Fertilizer	1.64	1.83	9.00	10.64	8.00	7.01
Pure Raw Knuckle Bone Flour	3.82	3.90	25.60	27.00	....	....
Soluble Corn and General Crops Manure	2.46	2.47	10.00	11.05	8.00	6.86
Soluble Potato Manure	5 00	5.12	10.00	11.31	8.00	6.76

